

## 1 CLAIMS

2 1. An air cooled gas discharge detector comprising:  
3 a gas discharge tube having an outer surface;  
4 an air passageway in contact with at least a portion of the outer surface of the gas discharge  
5 tube;  
6 an entry aperture for introducing air into the air passageway;  
7 an exit aperture for allowing air to flow out of the air passageway; and  
8 an air source for supplying a flow of air into the entry aperture for cooling the outer surface  
9 of the gas discharge tube.

10 2. The detector of claim 1 wherein the discharge is powered by radio frequency or  
11 microwave energy.

12 3. The detector of claim 2 wherein the radio frequency or microwave energy is  
13 generated by a magnetron.

14 4. The detector of claim 3 wherein the radio frequency or microwave energy is  
15 introduced into a cavity defined by an inner wall, two side walls and an outer wall, and wherein the  
16 inner wall surrounds at least a portion of the gas discharge tube.

17 5. The detector of claim 4 wherein the air passageway extends alongside at least a  
18 portion of an exterior of the side walls.

19 6. The detector of claim 5 wherein the gas discharge tube is made of sapphire.

20 7. The detector of claim 6 wherein the air source is an on board air pump.

21 8. The detector of claim 6 wherein the air source is a central compressor.

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9. A method of cooling a gas discharge tube in a gas discharge detector comprising:  
providing a gas discharge tube having an outer surface; and  
passing a flow of air over at least a portion of the outer surface of the gas discharge tube.

10. The method of claim 9 further comprising generating the flow of air by an on board  
air pump.

11. The method of claim 9 further comprising generating the flow of air by a central  
compressor.

12. The method of claim 9 further comprising powering the gas discharge tube with  
radio frequency or microwave energy.

13. A gas discharge detector comprising:  
a gas discharge tube;  
a power source for providing energy to the gas discharge tube; and  
an apparatus for air cooling the gas discharge tube.

14. The detector of claim 13 wherein the discharge is powered by radio frequency or  
microwave energy.

15. The detector of claim 14 wherein the radio frequency or microwave energy is  
generated by a magnetron.

16. The detector of claim 15 wherein the gas discharge tube is made of sapphire.

17. The detector of claim 16 wherein the apparatus for air cooling the gas discharge  
tube includes an on board air pump.

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18. The detector of claim 16 wherein the apparatus for air cooling the gas discharge tube includes a central compressor.

19. The detector of claim 15 wherein the radio frequency or microwave energy is introduced into a cavity defined by an inner wall, two side walls and an outer wall, and wherein the inner wall surrounds at least a portion of the discharge tube to form an air passageway.

20. The detector of claim 19 wherein the air passageway extends alongside at least a portion of an exterior of the side walls.

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